Project WET **Activity**	**Resources from Maryland Department of Natural Resources**	**Other Maryland Resources**
SUM OF THE PARTS – page 267 STUDENTS DEMONSTRATE HOW EVERYONE CONTRIBUTES TO THE POLLUTION OF A RIVER AS IT FLOWS THROUGH A WATERSHED AND RECOGNIZE THAT EVERYONE'S "CONTRIBUTION" CAN BE REDUCED. **Adaptation Suggestions:** To make the activity more relevant to students, use a local tributary from your watershed and ask students to brainstorm sources of pollution in their community. Using your watershed map, have students identify and describe the headwaters of their river (where it has flowed from before reaching their community) and the river mouth (where it enters the larger system) and it's path to the Bay or ocean. Have students investigate river or watershed cleanup data. Have students participate in or organize a local river or watershed cleanup event. **How to Take Action:** Storm Drain Stenciling http://www.dnr.maryland.gov/education/projectwet.html Alliance for the Chesapeake Bay - Project Clean Stream http://www.acb-online.org/project.cfm?vid=220 - Restore Corp http://www.acb-online.org/project.cfm?vid=77 Annual Potomac River Watershed Cleanup (Alice Ferguson Foundation). http://www.fergusonfoundation.org/cleanupmainframe.html Chesapeake Bay Foundation http://www.cbf.org/site/PageServer?pagename=action_index	Nonpoint Source Management Program (Recommended for high school students & teachers). http://www.dnr.state.md.us/bay/czm/nps/index.html What you can do to protect our waterways? http://www.dnr.state.md.us/bay/tribstrat/protect.html Surf Your Watershed http://www.dnr.state.md.us/watersheds/surf/	Chesapeake Bay Foundation – State of the Bay: Pollution http://www.cbf.org/site/PageServer?pagename=sotb_2004_pollution Chesapeake Bay Program – Pollutants http://www.chesapeakebay.net/stressor1.htm Alice Ferguson Foundation – interactive online activity, "*Ways of a Watershed*" http://www.fergusonfoundation.org/kidsmainframe.html

H20 OLYMPICS – page 30 STUDENTS COMPETE IN WATER OLYMPICS TO INVESTIGATE TWO PROPERTIES OF WATER, ADHESION AND COHESION. **Adaptation suggestion**: Use Maryland rivers as examples of water bodies (#2 in activity).		
INCREDIBLE JOURNEY – page 161 WITH A ROLL OF THE DIE, STUDENTS SIMULATE THE MOVEMENT OF WATER WITHIN A WATER CYCLE. **Adaptation Suggestion**: Extension: Have students research the current and annual river flow of Maryland tributaries (see Bay Monitoring) or tributary indicators such as impervious surfaces, water intake for drinking, & others they determine are importing for their community (see Surf Your Watershed below). Another source of up-to-date and historical information regarding precipitation in Maryland are newspapers – kids can scan their local paper or go online to research annual and record precipitation.	Bay Monitoring: River Input (flow) http://www.dnr.state.md.us/bay/monitoring/river/index.html Surf Your Watershed – Profiles http://mddnr.chesapeakebay.net/wsprofiles/surf/prof/wsprof.cfm?watershed=02140301	Alice Ferguson Foundation's interactive on-line activity, "*Water on the Move*" illustrates the water cycle. http://www.fergusonfoundation.org/kidsmainframe.html
POISON PUMP – page 93 THROUGH A SERIES OF CLUES, STUDENTS SOLVE A MYSTERY TO DISCOVER THAT WATER CAN HAVE NEGATIVE EFFECTS FOR PEOPLE. **Adaptation suggestions**: Ask students to list and describe local water-related diseases they have heard about in the media (e.g., West Nile virus). Relate this activity to students' local environment by having them research their community's water sources (see Maryland Drinking Water below). Ask them questions such as the following: *"In (insert your hometown here) where does our waste water go after leaving our school or your home?" (waste water treatment plant); "Based on what you know about watersheds and runoff, what might happen if there was a break in your neighborhood line?"; "What about excess storm water runoff: is there any danger that runoff from our neighborhoods might infect the local streams and rivers?"; "What if there were a farm or zoo nearby, would that have an impact?"*	**Sources of water-related diseases/toxins:** Harmful Algae http://www.dnr.state.md.us/bay/hab/index.html Maryland beach closures due to "swimmer's itch" http://www.dnr.state.md.us/bay/hab/microcystis.html	Maryland Drinking Water (A searchable website on regional water sources includes a list of water systems & water quality reports. Don't be intimidated by the format, have students scan the data for parameters you have discussed). http://www.epa.gov/safewater/dwinfo/md.htm West Nile Virus (MD Cooperative Extension): http://edcp.org/factsheets/wnv_fact.html Annual drinking water quality reports across America (Searchable by state). http://yosemite1.epa.gov/ogwdw/ccr.nsf/America?OpenView&Count=700 Brownfields in Maryland (Alliance for the Chesapeake Bay; Recommended for teachers & older high school students). http://www.acb-online.org/pubs/projects/deliverables-148-1-2003.pdf

A GRAVE MISTAKE – page 311
STUDENTS ANALYZE DATA TO SOLVE A MYSTERY AND IDENTIFY A POTENTIAL POLLUTER.

Adaptation Suggestion:
This problem is not far fetched!

Students can research the source of their drinking water in their community (see Sources in adjacent column). Students could locate a local cemetery, and research the groundwater below. They could research to see if there are any existing wells within this community (see Hydrogeology & Hydrology, and Arsenic Water Treatment for Individual Wells in Maryland in adjacent column).

Groundwater Withdrawals in Maryland (Surf Your Watershed – Indicators)
http://www.dnr.state.md.us/watersheds/surf/indic/md/md_gwuse_indmap.html

Sources of Drinking Water
Maryland Drinking Water (a searchable website on regional water sources includes a list of water systems & water quality reports. Don't be intimidated by the format; have students scan the data for parameters you have discussed).
http://www.epa.gov/safewater/dwinfo/md.htm

Hydrogeology & Hydrology (Maryland Geological Survey; several publications on regional groundwater sources & wells. The teacher will need to wade through the material, but there are some great tables & graphs that directly relate to this activity. The report "conclusions" may be something the teacher could edit for student reading.)
http://www.mgs.md.gov/hydro/pub/index.html
Annual drinking water quality reports across America (Searchable by state).

http://yosemite1.epa.gov/ogwdw/ccr.nsf/America?OpenView&Count=700

Arsenic Water Treatment for Individual Wells in Maryland (Maryland Dept. of Environment).
http://www.mde.state.md.us/assets/document/FactSheets/arsenic%20fact%20sheet%20final.pdf
Arsenic in Ground Water from the Maryland Coastal Plain Aquifers (Maryland Geological Survey; Limited info. for teachers but contact person provided).
http://www.mgs.md.gov/hydro/arsenic/index.html

Brownfields in Maryland (Alliance for the Chesapeake Bay; Recommended for teachers & older high school students).
http://www.acb-online.org/pubs/projects/deliverables-148-1-2003.pdf

Contaminants & Toxins in the Bay (Maryland Sea Grant; Good for all students).
http://www.mdsg.umd.edu/CB/toxics/index.html

THE PRICE IS RIGHT – page 333 STUDENTS LEARN ABOUT ECONOMICS AND ENVIRONMENTAL PLANNING AS THEY CALCULATE THE COST OF BUILDING A WATER DEVELOPMENT PROJECT.	Picture Maryland: Where do we grow from here? http://www.dnr.state.md.us/bay/picturemaryland/index.html	Urban Ground Water http://www.enviroliteracy.org/article.php/613.html Water Science for Schools - Water Use (this site isn't Maryland specific, but great for kids) http://ga.water.usgs.gov/edu/wateruse.html
EASY STREET – page 382 STUDENTS COMPARE THE QUALITIES OF WATER USED BY A CONTEMPORARY FAMILY TO ONE IN THE LATE 1800S, AND INVESTIGATE CHANGES IN WATER USE HABITS. **Adaptation Suggestions:** Conduct the "Extension," having students review their family's water bill and usage; Have students assess their family's water usage using one of the resources listed below. Have students research water use trends in Maryland (see Sources in adjacent column). Have students identify and coordinate a school, home or community-based water conservation project. **How to Take Action:** Conduct an assessment of your water usage (see Check-Up) and learn how you can conserve water (see Water Conservation).	**Assessing Water Usage** Be A Part of Something Big: *Are You a Water Waster*? http://www.dnr.state.md.us/education/are/big/big_waster.pdf Check-Up: Teacher's Guide for Assessing Natural Resources in Maryland Schools http://www.dnr.state.md.us/ed/checkup.html How to take action: Rainbarrel http://www.dnr.state.md.us/ed/rainbarrel.html	Freshwater Use Trends in Maryland, 1985 – 2000 (United States Geological Survey). http://md.water.usgs.gov/publications/fs-112-03/html/ Maryland Water Conservation Plan (Environmental Protection Agency). http://notes.tetratech-ffx.com/newsnotes.nsf/0/16e02a898e4be4ce85256b80005e9c91?OpenDocument Bay Plain and Piedmont: A Landscape History of the Chesapeake Heartland From 1.3 Billion Years Ago to 2000 (Chesapeake Bay Program). http://www.chesapeakebay.net/pubs/gateways/plainandpiedmont/index.htm Historic Drought Conditions in Maryland http://md.water.usgs.gov/drought/drought_md.html Water Science for Schools - Water Use (this site isn't Maryland specific, but great for kids) http://ga.water.usgs.gov/edu/wateruse.html National Geographic - The Chesapeake Bay is featured in the June/July issue of *National Geographic*. **Water Conservation** Chesapeake Bay Foundation http://www.cbf.org/site/PageServer?pagename=action_index Bayscaping to Conserve Water: A Homeowners Guide http://www.acb-online.org/pubs/projects/deliverables-85-2-2003.pdf Water Conservation (MD Dept. of Environment) http://www.mde.state.md.us/Programs/WaterPrograms/Water_Conservation/Water_Factsheet/index.asp

RAIN STICK – page 442 STUDENTS BUILD A RAINSTICK OUT OF MATERIALS IN THEIR OWN ENVIRONMENT AND, LIKE PEOPLE OF ANCIENT CULTURES, IMITATE THE SOUND OF RAIN. **Adaptation Suggestion:** Have students research MD culture & heritage to learn how art & music are connected to natural resources (see Blacks of the Chesapeake & Footsteps to the Sea). **How to take action:** Chesapeake Bay Program (ideas for various conservation & restoration projects). http://www.chesapeakebay.net/involvedschools.htm	Blacks of the Chesapeake Bay http://www.dnr.state.md.us/irc/boc.html	Chestory: Center for the Chesapeake Story - *Made of Water: Songs & Celebrations of the Mid-Atlantic Rivers into Chesapeake* http://www.chestory.org/cd.htm Footsteps in the Sea While this is not a Maryland-specific curriculum, it provides an excellent example of how to integrate social studies (history, anthropology, economics & government) into the investigation of science issues. http://www.bullfrogfilms.com/catalog/fits.html
A DROP IN THE BUCKET – page 238 BY ESTIMATING & CALCULATING THE PERCENT OF AVAILABLE FRESH WATER ON EARTH, STUDENTS UNDERSTAND THAT WATER IS LIMITED AND MUST BE CONSERVED. **Adaptation Suggestions:** Have students research freshwater availability and use in Maryland. Have students research water use trends in Maryland (see Sources in adjacent column). Have students assess their family's water usage using one of the resources listed below. Have students identify and coordinate a school, home or community-based water conservation project. **How to Take Action:** Students can assess their water usage and learn ways to conserve water (see Check-Up and Water Conservation in adjacent column).	**Assessing Water Usage** Be A Part of Something Big: *Are You a Water Waster*? http://www.dnr.state.md.us/education/are/big/big_waster.pdf Check-Up: Teacher's Guide for Assessing Natural Resources in Maryland Schools http://www.dnr.state.md.us/ed/checkup.html **Water Conservation** How to take action: Rainbarrel http://www.dnr.state.md.us/ed/rainbarrel.html Surface Water Withdrawals (Surf Your Watershed – Indicators) http://www.dnr.state.md.us/watersheds/surf/indic/md/md_swuse_indmap.html	**Availability of Fresh Water in Maryland** Publications on MD county water resources (Maryland Geological Survey) http://www.mgs.md.gov/hydro/pub/index.html Maryland Dept. of the Environment - Maryland Drought Info http://www.mde.state.md.us/water/drought/index.asp - Drought - Current Conditions http://www.mde.state.md.us/Water/Drought/current_conditions/index.asp - Water Supply http://www.mde.state.md.us/Programs/WaterPrograms/Water_Supply/index.asp United States Geological Survey: Freshwater Use and Withdrawals in Maryland: http://md.water.usgs.gov/freshwater/withdrawals/ Estimated Streamflow Entering Chesapeake Bay (updated frequently) http://md.water.usgs.gov/monthly/bay.html USGS: Stream Flow & Groundwater (includes monthly water conditions) http://chesapeake.usgs.gov/streamflow.html Fresh Water Use Trends & Water Withdrawals 1985 – 2000 (Maryland) http://md.water.usgs.gov/publications/fs-112-03/html/

[A Drop in the Bucket, cont'd]		**Water Conservation** Bayscaping to Conserve Water: A Homeowners Guide http://www.acb-online.org/pubs/projects/deliverables-85-2-2003.pdf Rainbarrel Math (Living Classroom. An activity that connects conservation with middle school math) http://livingclassrooms.org/slurrp/circlemath.doc Chesapeake Bay Foundation http://www.cbf.org/site/PageServer?pagename=action_index
GET THE GROUNDWATER PICTURE – page 136 STUDENTS LEARN ABOUT BASIC GROUND WATER PRINCIPLES AS THEY CREATE A GEOLOGIC CROSS SECTION OR EARTH WINDOW. **Adaptation Suggestions:** Have students research ground water in Maryland. The Maryland Geological Survey provides a publication on regional groundwater sources and wells. The teacher will need to wade through the material, but some great tables & graphs directly relate to this activity (the report "conclusions" could be edited for student reading).	Groundwater Withdrawals in Maryland (Surf Your Watershed – Indicators) http://www.dnr.state.md.us/watersheds/surf/indic/md/md_gwuse_indmap.html	Hydrogeology & Hydrology Program (Maryland Geological Survey; for teachers or older high school students). http://www.mgs.md.gov/hydro/pub/index.html Maryland Dept. of the Environment: Water Conservation http://www.mde.state.md.us/Programs/WaterPrograms/Water_Conservation/index.asp Chesapeake Bay Program – Groundwater http://www.chesapeakebay.net/wquality.htm
COLOR ME A WATERSHED – page 223 THROUGH INTERPRETATION OF MAPS, STUDENTS OBSERVE HOW DEVELOPMENT CAN AFFECT A WATERSHED. **Adaptation Suggestions:** Have students research their local watershed (see Surf Your Watershed etc. in adjacent column), including different watershed profiles, such as population, habitats, % forested area, impervious surfaces etc., in their region. Have students assess urban sprawl in their community, its impact on the watershed, and propose a plan for sustainable development (see Smart Growth). Have students compare historic maps with current maps (see Maptech's Historic Map Catalog for historic maps of your local area – availability varies but for the most part there are multiple maps spanning decades for a huge selection of locales; or Maps from Maryland State Archives - major towns only).	Surf Your Watershed http://www.dnr.state.md.us/watersheds/surf/ Watershed Profiles http://mddnr.chesapeakebay.net/wsprofiles/surf/prof/prof.html Where do we grow from here? (A downloadable teachers resource guide on growth & its impact on Maryland; lots of resources including slideshows). http://www.dnr.state.md.us/education/growfromhere/TOC.HTM	State of the Bay Poster (Updated annually) To request copies, contact: slaubhan@chesapeakebay.net Chesapeake Bay & Mid-Atlantic From Space (Towson Univ.). Remote sensing & impervious surface data (Note: This site is new but updated often, 7/05). http://chesapeake.towson.edu/ "*Currents*" an on-line newsletter of current Bay issues (Chesapeake Bay Program) http://www.chesapeakebay.net/enews.htm Maryland Sea Grant Schools Online Network News (Relevant articles written in kid-friendly terms): http://www.mdsg.umd.edu/Extension/msgsnn/ Alice Ferguson Foundation – interactive online activity, "*Ways of a Watershed*": http://www.fergusonfoundation.org/kidsmainframe.html Chesapeake Bay Program – (click on "*Watersheds*,"

[Color Me a Watershed, cont'd]		"*Land & People*," & "*History*" for information on population & development trends as well as publications): http://www.chesapeakebay.net/ & Watershed Development Trends http://www.chesapeakebay.net/status.cfm?sid=197 USGS Satellite Map of the Chesapeake Bay (Poster – for purchase or downloadable version) http://chesapeake.usgs.gov/poster.html USGS Ecosystem History & Change: (great maps & images on: Geologic Framework; Land-Use; Climate Variability; Sediment Sources; Remote Sensing) http://geology.er.usgs.gov/eespteam/Atlantic/ Smart Growth (Recommended for teachers & high school students). http://www.arch.umd.edu/URSP/People/faculty/jcohensgchapter.pdf Growth, Sprawl & the Chesapeake Bay (Chesapeake Bay Foundation) http://cbf.convio.net/site/PageServer?pagename=resources_facts_sprawl Land Use in the Chesapeake Bay (Maryland Sea Grant; recommended for high school students). http://www.mdsg.umd.edu/Policy/landuse.html Sound Land Use (Chesapeake Bay Program) http://www.chesapeakebay.net/restrtn.htm Maryland Mapping Resources Guide (Topographical maps of Maryland; recommended for high school students and teachers). http://www.mdmerlin.net/ Maps from Maryland State Archives http://www.mdarchives.state.md.us/msa/mdmanual/01glance/maps/html/00list.html Maryland Department of Planning Maps (This is an awesome site! Although it is not obvious, click on the map to zoom in. Continue clicking on the section of the map you want to zoom to see neighborhoods).

[Color Me a Watershed, cont'd]		http://www.mdp.state.md.us/maps.htm USGS's National Geologic Map Database (Just a few maps of MD available). http://ngmdb.usgs.gov/ Topozone (Free, online topographic maps all students). http://www.topozone.com Maptech's Historic Map Catalog (An awesome site!). http://historical.maptech.com/index.cfm
THE PUCKER EFFECT – page 338 STUDENTS OBSERVE HOW GROUND WATER TRANSPORTS POLLUTANTS, AND SIMULATE GROUND WATER TESTING TO DISCOVER THE SOURCE OF CONTAMINATION. **Adaptation Suggestion:** Relate this activity to students' local environment and current events by having them research groundwater issues that are of current or ongoing concern in Maryland (see Sources in adjacent columns).	Groundwater Withdrawals in Maryland (Surf Your Watershed – Indicators) http://www.dnr.state.md.us/watersheds/surf/indic/md/md_gwuse_indmap.html	Water Conservation (Maryland Dept. of Environment) http://www.mde.state.md.us/Programs/WaterPrograms/Water_Conservation/index.asp USGS: Stream Flow & Groundwater (Includes monthly water conditions) http://chesapeake.usgs.gov/streamflow.html Hydrogeology & Hydrology Program (Maryland Geological Survey; Teachers & high school students). http://www.mgs.md.gov/hydro/pub/index.html Maryland Drinking Water (Searchable regional water sources includes water systems & water reports. Format can be intimidating - scan for relevant contaminants). http://www.epa.gov/safewater/dwinfo/md.htm Arsenic Water Treatment for Individual Wells in Maryland (Maryland Dept. of Environment). http://www.mde.state.md.us/assets/document/FactSheets/arsenic%20fact%20sheet%20final.pdf Arsenic in Ground Water from the Maryland Coastal Plain Aquifers (Maryland Geological Survey; Limited info. for teachers but contact person provided). http://www.mgs.md.gov/hydro/arsenic/index.html Brownfields in Maryland (Alliance for the Chesapeake Bay; for teachers & older high school students). http://www.acb-online.org/pubs/projects/deliverables-148-1-2003.pdf Chesapeake Bay Program – Groundwater http://www.chesapeakebay.net/wquality.htm